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ABSTRACT

Compared was the effectiveness of punishment and positive reinforcement on the nonattending behaviors and academic achievement of 18 elementary grade children in two special classes for children with social or adjustment problems. During the positive reinforcement condition each student earned a slash mark whenever he was observed attending to task, while in the punishment condition, slash marks were placed next to each student's name and then removed when the student was observed in an off task behavior. Results indicated that punishment in the form of response cost did not appear to be associated with dysfunctional side effects, and that there was no relationship between increases in academic production and changes in nonattending behavior. (DB)

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# A COMPARISON OF POSITIVE REINFORCEMENT AND PUNISHMENT IN TWO SPECIAL EDUCATION CLASSES

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Whenever the subject of punishment is introduced as a possible means of controlling human behavior, few individuals react to the topic in an unconcerned fashion. Punishment is associated with medieval techniques, extreme pain, vindictiveness, and unpredictable consequences. Even so, punishment is still a major behavioral control technique in most of man's institutions and cultures (Skinner, 1971). Lurking behind man's generally conforming social behavior and, to a great extent, preventing or controlling inappropriate behaviors are punitive consequences for unacceptable and careless behaviors.

Much of punishment today is considerably less aversive than in the past. It does not require much of an historical or geographical step, however, to uncover times and places where highly aversive consequences for behavior were and are condoned and supported by law.

In short, because we use them so frequently, we appear convinced that punishment and aversive control techniques are the forces which maintain order in society and, in education, the tie which holds the classroom together.

In most school systems, harsh punishments have been at least administratively removed from the established and supported repertoire of methods available to educators for controlling and manipulating their students. Laws have been passed which control and define the conditions under which certain forms of punishment may be administered in schools.

Though corporal punishment is rarely used in most schools, other potentially aversive consequences such as suspension, detention, grades, threats, demerits, exclusion, withdrawal of reinforcers, and humiliation are often used in an attempt to control student behaviors. For the most part, educators admit that punishment, as applied in most schools, is not a particularly effec-

tive procedure. As a result, educators generally support the use of positive reinforcement as a means of achieving a healthy classroom climate. Research supports their belief that positive reinforcement is an effective means of increasing appropriate classroom behaviors.

Many studies by Hall, Lund and Jackson (1968); Madsen, Becker and Thomas (1968); Surratt, Ulrich and Hawkins (1969); Broden, Bruce, Mitchell, Carter and Hall (1970); Hall, Panyan, Rabon and Broden (1968); and Walker and Buckley (1972) have demonstrated that positive reinforcement is a powerful technique for increasing appropriate behaviors in the classroom. The implication seems to be that positive reinforcement systems are more efficient, less fraught with complexities and uncertainties, and better suited to the development of successful learning than are punishment procedures. Other studies have demonstrated that both positive reinforcement and punishment can be effectively used to alter particular classroom behaviors (Gallagher, Sulzbacher and Shores, 1967; Hall, Axelrod, Fondopoulos, Shellman, Campbell and Cranston, 1971; Hall, Lund and Jackson, 1968; Madsen, Becker and Thomas, 1968; O'Leary and Becker, 1969; O'Leary, Kaufman, Kass and Drabman, 1972; Wolf, Giles and Hall, 1968). In spite of the demonstrated effectiveness of both procedures, positive reinforcement remains the preferred procedure by most educators (Clarizio, 1971). One of the reasons for the rejection of punishment procedures by educators is the contention that punishment results in undesirable side effects (Bandura, 1969; Skinner, 1971; Solomon, 1964; Johnston, 1972; Sulzer and Mayer, 1972). There is some evidence from laboratory studies using animals that punishment procedures do, in fact, produce dysfunctional side effects (Azrin and Holz, 1966).

The unalterable conclusion remains, nevertheless, that punishment, whether applied intentionally or incidently, exists in human interactions with other

humans and with the physical world. In short, it is probably fruitless to hope for a world in which punishment does not exist. Punishment procedures such as time-out and response cost appear to be unavoidable procedures where there is human interaction (Azrin and Holz, 1966). In an article on punishment in the American Psychologist, Johnston (1972) indicated that "throughout our daily activities we are constantly barraged by a variety of stimuli which have punishing effects, whether it be someone's frown or bumping into a chair we did not see. In other words, unconditioned and conditioned punishing stimuli as consequences to behavior delivered by our social and physical environment are as much a natural part of our lives as are positively reinforcing consequences. This being the case, behavioral science should undertake to understand and to control the results of their use (p. 1051)."

So far, I have been rather glibly using the term "punishment." From a behavioral viewpoint the term punishment has a very specific meaning. By Azrin and Holz's (1966) definition: "An unequivocal aspect of punishment seems to be that punishment reduces a behavior when the punishment is arranged as a consequence of that behavior. Hence, our minimal definition will be a consequence of behavior that reduces the future probability of that behavior. Stated more fully, punishment is a reduction of the future probability of a specific response as a result of the immediate delivery of a stimulus for that response. The stimulus is designated as a punishing stimulus; the entire process is designated as punishment (p.38)."

Azrin and Holz (1966) also indicate that it is inappropriate to define a stimulus as punishing merely because it may produce a sense of discomfort or unhappiness. In addition, "A simple decrease in responding is not a sufficient reason for classifying a procedure as punishment. Satiation, extinction, drugs, disease, stimulus change, etc., also may reduce responding (Azrin and Holz, 1966, p. 381)." Conversely, punishment does not appear to lead to the increase of unpunished responses unless those responses are under the control

of some reinforcement contingency or there is forced choice between the punished response and a nonpunished response (Johnston, 1972). This definition, then, was the one used in the present study.

Before discussing the study, I would like to indicate that there are two general experimental issues which were examined by the study. The first issue concerns the effectiveness of positive reinforcement and punishment, and the second concerns the effects of punishment and positive reinforcement on nonmanipulated behaviors.

It was the intent of the present study, therefore, to record varied behaviors selected for their suitability in comparing the effects and side effects of positive reinforcement and punishment in two special classes. Behavioral techniques were consequently applied to target behaviors in order to compare the effectiveness of the two procedures while the effects on the nonmanipulated behaviors were observed and documented.

In terms of effectiveness, previous research predicted that both positive reinforcement and punishment would effectively lead to the reduction of off-task behavior either through the positive reinforcement of on-task performance or through the punishment of off-task behavior. Very few studies compared the effectiveness of the two procedures.

In terms of the side effects or nonmanipulated behaviors, there were nine experimental issues. The nine experimental issues focused on five general categories of nonmanipulated behaviors: aggression, social interaction with the punishing agent, avoidance behavior, escape behavior, and academic product. More specifically, the study responded to the following questions: first, would student aggression towards other students change in frequency during a response cost condition when compared to its occurrence during positive reinforcement and baseline conditions in a classroom setting?

Second, would student aggression towards the teacher change in frequency

during a response cost condition when compared to its occurrence during positive reinforcement and baseline conditions?

Third, would positive student-teacher interactions during a response cost condition change in frequency when compared to their occurrence during positive reinforcement and baseline conditions in a classroom setting?

Fourth, would the occurrence of student solicitation for teacher interaction (e.g., hand-raising, calling the teacher's name, etc.) during a response cost condition change in frequency when compared to its occurrence during positive reinforcement and baseline conditions in a classroom setting?

Fifth, would the occurrence of student absence from school during a response cost condition change in frequency when compared to its occurrence during positive reinforcement and baseline conditions in a classroom setting?

Sixth, would the occurrence of student absence from the punishing environment during a response cost condition change in frequency when compared to its occurrence during positive reinforcement and baseline conditions.

Seventh, would the number of arithmetic problems completed correctly during a response cost condition change in frequency when compared to the number completed correctly during positive reinforcement and baseline conditions in a classroom setting?

Eighth, would students produce more incorrect arithmetic problems during a response cost condition than during positive reinforcement and baseline conditions? and

Ninth, would students produce more nonproblem solving writing (spoilage) on math papers during a response cost condition than during positive reinforcement and baseline?

In summary, the purposes of the study were to determine the relative ability of each process to reduce nonattending behavior and to find out whether

either or both processes were associated with the following side effects: student-student aggression, student-teacher aggression, positive interaction between the student and teachers, student avoidance behavior, student escape behavior, arithmetic problems completed correctly, arithmetic problems completed incorrectly, and nonproblem solving spoilage on arithmetic problem sheets. Class I and Class II consisted of nine students assigned to special education classrooms because of social and emotional adjustment problems in regular classrooms. The students in Class I were removed from fourth and fifth grade regular classrooms and those in Class II were removed from first, second, and third grade regular classrooms.

During the positive reinforcement condition, each student earned slash marks which were placed on the blackboard next to the student's name each time the youngster was observed attending to task. During the punishment condition, slash marks were placed on the blackboard next to each student's name at the beginning of each session. Following each observation of off-task behavior during the session, the teacher crossed off a slash mark next to the names of those students who were observed not attending to task. At the conclusion of every session, each student was permitted to exchange the slash marks next to his name for a variety of back-up reinforcers.

The study consisted of six phases: adaptation ($A_P$); baseline one ($B_1$); positive reinforcement ($P_R$); baseline two ($B_2$); punishment ($R_C$); and baseline three ($B_3$). The experimental conditions for Class I were: $B_1$, $P_R$, $B_2$, $R_C$, and $B_3$. Class II received $P_R$ and $R_C$ in reverse order. Beginning with the initial baseline phase $B_1$, students in both classes received specially designed arithmetic problem sheets which consisted of a combination of addition, subtraction, multiplication, and division problems. The arithmetic problem sheets were given to the students at the beginning of each session and collected at the conclusion of each session.

The results of the comparison between the effectiveness of positive reinforcement and punishment indicated that both procedures were equally effective in controlling nonattending behavior. In addition, the order of procedural presentation did not appear to be a significant factor in the effectiveness of the two procedures. The effects of a comparison of positive reinforcement and punishment in terms of the occurrence of student-student aggression, student-teacher aggression, positive interaction between the student and the teacher, student avoidance behaviors, student escape behaviors and the number of problems completed incorrectly indicated that none of these side effects were more likely to occur during the punishment condition than during the positive reinforcement or baseline conditions.

The results of the study were ambiguous in terms of the relationship between the number of arithmetic problems completed correctly and the level of nonattending behavior. When nonattending behavior was reduced during the positive reinforcement conditions $P_R$, there was an initial increase in the number of problems completed correctly. When the positive reinforcement conditions were withdrawn and nonattending behavior returned to baseline levels, however, the number of problems completed correctly remained at or above the $P_R$ level. The reduction of nonattending behavior during punishment $R_C$ did not result in a significant change in the number of problems completed correctly when compared with trends across all experimental conditions in Class II or when compared with surrounding baseline conditions in Class I. Nonproblem solving spoilage on the arithmetic problem sheets did increase during the punishment conditions for Class I but appeared more related to procedural adaptation and the age of the students than to the punishment procedure.

The predicted effectiveness of the positive reinforcement procedure and the response cost procedure was verified by the dramatic reduction in off-task

behavior in both Class I and Class II. The reversal conditions indicated that the procedures were responsible for causing the immediate and sustained control over off-task behavior during the $P_R$ condition and the $R_C$ condition.

The data accumulated in this study concerning the comparative effectiveness of the two procedures, therefore, indicated that procedural selection in terms of the two procedures used in this study is relatively unimportant when targeting off-task behavior.

The apparent equal effectiveness of the two procedures in terms of the reduction of off-task behavior did not result in similar reactions to the two procedures by the teachers. The teacher of Class I was interviewed at the conclusion of the study to obtain her personal reactions to the entire study. Less formal discussions with the teacher of Class II indicated that she reacted to the study in much the same manner as did the teacher of Class I. The experimenter asked the teacher of Class I to respond to the following general categories: (1) her general characterization of the experimental conditions in terms of her reaction to adaptation, baseline conditions and treatment conditions and her perceptions of changes in disruptive behaviors during those conditions; (2) the teacher's procedural preference in terms of the effects and in terms of administrative requirements; and (3) her perception of student reaction to the experimental conditions.

The teacher's general reactions to the experiment agreed with those of Winett and Winkler (1972) and Ferritor et al (1972) in that she felt that the overall effect of the procedures was to produce docile and quiet behavior which may not have been particularly productive. She did indicate, however, that both procedures were highly effective in reducing disruptive behavior. In terms of the adaptation phase, the teacher reported that the experimenter and the reliability observer successfully adapted into the classroom. Nevertheless, she indicated that though the students appeared to ignore the observers and did not seem to be aware of the cooperative effort between the teacher and

the experimenter, student interest in the experimenter and the reliability observer was not totally neutral. The teacher indicated that the baseline conditions were extremely difficult particularly after she had mastered techniques for controlling student behavior. She expressed a very definite preference for the positive reinforcement condition because she felt that the response cost condition was "particularly harsh" and "unfair" even though she believed that the response cost procedure was the more powerful of the two procedures.

The teacher also stated that the response cost condition was more easily administered than the positive reinforcement condition because "of the more efficient identification of students exhibiting contingent behaviors during the response cost condition." Considering her less than neutral feelings about the two conditions, she reported that, in her opinion, the students "found very little difference in one procedure over the other."

Although the $P_R$ procedure and the $R_C$ procedure were equally effective in reducing off-task behavior, there remains the question as to whether the reduction resulted in a climate conducive to learning and consequent related increases in academic product. As O'Leary (1972) points out, the goal of most behavioral procedures in classrooms "has been to reduce disruptive behavior not to a zero level but in a manner that might make academic progress more likely (p.507)."

There is little question that disruptive and nonattending behaviors as defined for this study were sufficiently reduced to permit substantial improvements in academic production. As indicated earlier, there does appear to be an initial procedural impact on academic production when the $P_R$ condition is first introduced in both classes which exceeds the initial

effects produced during all other conditions. However, when nonattending behavior was returned to baseline levels there was no corresponding reduction in academic product. Consequently, this study fails to support claims by experimenters such as Surrat et al (1969) that decreases in so-called non-attending behaviors will produce an improvement in academic achievement.

The results of this study indicated that the incidence of aggressive behaviors in both Class I and Class II were not related to the application of either positive reinforcement or punishmert. Although the measured frequency of aggressive behavior across all conditions for both classes remained at low levels, there was not, in the opinion of the experimenter, a change in the quality of aggressive behaviors during either the positive reinforcement or response cost conditions when compared with baseline conditions.

The absence of an increase in aggressive behaviors during the punishment condition does not lead to the conclusion that punishment and increases in aggressive behavior are always unrelated. In this study the punishment procedure was carefully selected and controlled in order to minimize the occurrence of aggressive responses.

Another reason for the stability of aggressive responses across conditions can be attributed to the availability of alternative responses. According to Azrin and Holz (1966), the potential for the appearance of aggressive behaviors increases as the intensity of the punishing stimulus increases, particularly if there is no nonpunished alternative response available to the punished subject. In this study there was constantly available at least one nonpunished alternative response available to the students in the form of the math problem sheets. Although Azrin and Holz (1966) state that punishment by means of

response cost "is similar to intense electric shock in terms of the extent of the response reduction achieved (p. 392)," the intensity of the punishing stimulus in this study was considered relatively mild. In addition, the use of an individual contingency as opposed to a group contingency may have also tended to reduce the probability of aggressive responses during both conditions.

The lack of increased aggressive behaviors during the punishment condition can also be attributed to the simplicity and efficiency of punishment by means of response cost. Although time-out is frequently used as punishment in schools (Clarizio, 1971) and more thoroughly investigated in both clinical and laboratory settings than response cost (Kazdin, 1972), the use of time-out as the punishing event would have required removal of the punished subjects from the classrooms for a specified period of time. The act of removal from the classroom may have required physical contact between the person applying the procedure and the subject, which would probably have led to increased aggressive responses. With $R_C$, however, there is no cause to engage in physical contact and "there is no necessary temporal restriction on available reinforcement (Kazdin, 1972, p. 534)." Consequently, punishment by means of response cost can be administered impartially, immediately, at maximum intensity, and with minimal procedural "noise." The "cleanliness" of both the positive reinforcement and response cost procedures was confirmed by the teacher of Class I. She reported that "in both conditions the procedures were carried out rather unemotionally in the sense that I didn't get excited. I merely carried out the procedure and I think that what happened was that the procedure did the working. In short, it was the procedural event that primarily controlled the situation and not my behavior."

As Azrin and Holz (1966) indicated, one of the major disadvantages of using punishment seems to be "that when punishment is administered by an

individual, the punished individual is driven away from the punishing agent, thereby destroying the social relationship (p.441)." In this study, however, positive interactions between the students and teachers remained relatively constant regardless of whether the teachers were the punishing agents or the reinforcing agents. Considering the number of recent studies which have demonstrated the effects of contingent teacher attention on student behavior (Cossairt, Hall and Hopkins, 1973; Hall, Lund and Jackson, 1968; and Thomas, Becker and Armstrong, 1968) and the effects of contingent student attention on teacher behavior (Gray, Graubard and Rosenberg, 1974; and Sherman and Cormier, 1974), the stable rate of social interaction between the student and teacher, in spite of the student's or the teacher's behavior, seems contrary to expected results. When compared to baseline conditions, the fact that increased positive interaction between the teachers and the students failed to materialize even during the positive reinforcement condition may be related to the neutral social valence associated with the administration of both procedures. First of all, teacher contact with students in terms of providing positive reinforcement and punishment was not controlled by the teachers. The teachers merely acted as the vehicle through which procedures were carried out. Secondly, the teachers of Class I and Class II were neither encouraged nor discouraged from initiating voluntary contact with students during any condition; and finally, teachers were cautioned not to associate praise or blame with the application of positive reinforcement or punishment. The neutrality of the teacher in this case permitted a relatively unbiased evaluation of the differential effects of positive reinforcement and punishment on the social interaction between the reinforcing or punishing agent and the students.

The most important indicator of a breakdown in social communication in

terms of the reinforced or punished student was the variable labeled student-teacher response. This variable measured the voluntary efforts of students to engage in social and/or instructional contact with the teacher whether she were the reinforcing or punishing agent. The level of voluntary social engagement as measured by student-teacher response failed to show any differences between positive reinforcement and punishment.

Thus, based on this study, punishment in the form of a response cost does not appear to be associated with the dysfunctional side effects often expected when punishment is used to control human behavior. Perhaps of equal importance, the study fails to show a relationship between increases in academic product and changes in nonattending behavior. Although logic suggests that there must be a relationship between attending behaviors and academic product, it may be more productive to target academic production and let attending behavior seek its own levels.

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